

describes as working in a few moments any logical problems involving no more than four distinct terms or things. It was like a small piano, three feet high, with twenty-one keys. A second book upon logic was published in 1869, just after this had been made to work correctly, entitled "The Substitution of Similars," containing a sketch of the fundamental doctrine of his great work, "The Principles of Science," which was not published in full till 1874, but reached a second edition in one volume in 1877.

In 1870 his "Elementary Lessons in Logic" appeared in Macmillan's series of science class-books, followed in 1876 by the "Primer of Logic," one of the same publishers' more elementary series; and in 1880 "Studies in Deductive Logic" for students desiring a more thorough course of logical training.

In 1868 he had prepared three articles attacking J. S. Mill's system of logic. They were declined at first, but three years afterwards, soon after the death of Mr. Mill, they were accepted by the *Contemporary Review*. It is curious to see two such mighty champions of such a learned science referring their differences to an uneducated public and to their instinctive logic!

Though sorry on many accounts to leave Manchester, his heart had never left London and its University, to which he returned in 1876 as Professor of Political Economy. In that year he boldly read a paper laying it down that the United Kingdom Alliance was the worst existing obstacle to temperance reform in the kingdom—driving the enemy to a man into fierce opposition.

His first illness through over-work had occurred in 1869, and from that time his letters in large proportion are from various places—Norway was his favourite resort—to which he had been driven to regain strength. Trip after trip was taken, but with no permanent effect. As soon as he returned he again overwhelmed himself with work, involving too great tension of the brain. The labour especially of taking his class when out of sorts was a "painful" labour to him. To relieve himself from this he resigned his Professorship in 1880, and in 1882, after two years more of work at home, but still at high pressure, a plunge into the sea was too sudden a chill for his enfeebled frame, and insensibility and death were the sad result, at the prime age of forty-six.

One cannot help sorrowfully noting how his childish bashfulness was the cause of his early death. It led to unsociability and abstinence from recreation. Instead of rejoicing in his strength, he shunned his companions, and persuaded himself, moreover, that it was his duty to do so, though he bitterly regrets it afterwards, one result being an inability to speak in public and communicate his ideas as he would wish. The ardent cultivation of his many talents, again, increased a feeling of superiority, yet often left him low-spirited. In some it might have brought carelessness and improvidence, but in Jevons it was attended by a feeling of responsibility almost religious. At twenty-three he threw up his easy and lucrative post at the Sydney Mint in obedience to this feeling, and, later on, he resigned one laborious duty only to buckle to another, and under such labour his life was quenched.

GENERAL PATHOLOGY

An Introduction to General Pathology. By J. B. Sutton, F.R.C.S. (London: J. and A. Churchill, 1886.)

UNTIL recently, pathologists have confined their attention to studying the processes of disease in human beings, and but little effort has been made to take advantage of the vast field of material presented by the animals which die in the Gardens of the Zoological Society. Since 1878 the author has systematically examined the bodies of 12,000 animals and of over 800 still-born and immature fetuses; and from this vast stock of material he has, for the purposes of the present work, selected, from all parts of the animal kingdom, striking examples which illustrate the main pathological and physiological processes of life. The same principles govern both, and processes which in one group of animals are the cause of disease, in another, owing to anatomical differences, habits of life, and surroundings, have no such influence. Moreover, pathological defects are frequently inherited, and become looked upon as racial peculiarities. Thus the horns of the Ungulata, the curved canines of the Babiroussa, the atrophied right ovary and right carotid artery in many birds, the large third with the small second and fourth metacarpals of the horse, are now persistent, but were probably originally accidental and pathological.

The degree of development of the muscular tissue of the gizzard of a bird is dependent upon the nature of its food. The herring-gull of the Shetland Islands changes its food twice every year—in the summer living on grain, when its gizzard is of the granivorous type, and in the winter on fish, when the gizzard reverts to the carnivorous condition. The same variations have been artificially produced by varying the food of sea-gulls, pigeons, ravens, and owls. While excessive function is the great cause of hypertrophy of organs, deficient usage is the determining factor in the abnormal overgrowths of hair, nails, beaks, and teeth. Rodents in captivity frequently require their teeth to be artificially shortened in order to avert the fatal effects of excessive overgrowth.

Monkeys, when in confinement, frequently die with symptoms of more or less complete paraplegia, which has recently been shown to be due to an overgrowth (frequently rickety) of the vertebræ near the intervertebral lamellæ. This gradual compression of the cord also occurs in tigers, lambs, bears, and others. These facts observed in animals throw light upon the agonising pains of mollities osium, which are doubtless in like manner due to compression of the cord and nerves, which is permitted by the softening of the bones which the disease causes.

Metschnikoff's definition that inflammation is a struggle between irritant bodies and white blood-corpuscles is adopted. Illustrations are given showing the white corpuscles surrounding and digesting micro-organisms and other foreign bodies, or dying in the attempt to do so. When the tails and gills of larval batrachians are being absorbed, numerous amoeboid cells can be seen containing fragments of nerve-fibres and muscle.

Our present knowledge of the nervous system quite fails to offer any explanation of the experiment which the author performed by transposing the median and ulnar nerves in

a cat. The two nerves were divided about the middle, and the distal end of the median was united to the proximal end of the ulnar, and *vice versa*. Union occurred: sensation and motion returned in six weeks. The cat regained complete use of the limb, and did not appear to suffer any inconvenience. It would be of great interest to repeat the experiment by attaching the proximal end of the median to the distal end of the ulnar, but to prevent the other ends from uniting. Would the result be an unimpaired function of the median nerve, transmitted from the portions of the brain and cord formerly associated with the function of the ulnar?

The classification of the cysts and neoplasms of the animal kingdom are illustrated by many typical examples. The teratomata are fully discussed, and it is shown that they almost invariably occur only in spots where the epi-, meso-, and hypo-blastic layers have been temporarily but directly in continuity with each other. Thus præsacral tumours are associated with the obsolete neurenteric canal; pituitary tumours with the canalis craniopharyngeus (a canal through the floor of the basisphenoid), lingual dermoid cysts with the ductus thyroglossus (a canal running from the basihyoid to the foramen cæcum of the tongue), and ovarian dermoid cysts with the obsolete Müllerian and Wolffian ducts. The predisposition of obsolete ducts to disease has for some time been recognised, but the close relationships of teratomata to such ducts is a more recent piece of work.

The novel illustrations of the leading pathological processes make the work one of extreme interest, and we heartily congratulate the author on the good use to which he has turned his exceptional opportunities.

PLANE GEOMETRY

The Elements of Plane Geometry. Part II. (corresponding to Euclid, Books III., IV., V., VI.). (London: Swan Sonnenschein, 1886.)

THIS book contains a revised edition of Books III., IV., V., of the "Syllabus of Plane Geometry" drawn up by the Association for the Improvement of Geometrical Teaching, with demonstrations of the propositions, and an excellent, though limited, collection of suitable exercises. If nothing else than these two parts had been the outcome of the movement first set on foot in our columns, the Association would have amply justified its formation. Much difference of opinion has prevailed as to the desirability or expediency of the Association producing such a work as this. The late Mr. Merrifield for some years strenuously opposed any such proceeding, but at the annual meeting of 1881 he expressed himself as "now satisfied from the experience which he had had in dealing with the examining bodies that they would not get their work really adopted by the public until they had a text-book. Everywhere he was met with the impossibility of wading through a dry Syllabus. Nobody who was not thoroughly versed in mathematics could judge whether there was any real possibility of teaching from the Syllabus at all." Circumstances appear to have compelled the Association at last to take the field with demonstrations put forward by a selected committee of its members: a principal reason being that the Association was bound to help teachers. The plan of teaching the Syllabus without

giving written proofs was found to succeed so long as the teaching was confined to the earlier parts of the subject, but when the later books were reached it was found necessary to give formal written proofs for subsequent reference (Report, 1881, p. 30).

Some teachers who wish for the more copious introduction of modern ideas and methods into the very elements may not consider the work of the Association as satisfactory as could be wished, and may think there is very little of the influence of the aforesaid modern ideas in the Syllabus, yet even such admit, and express satisfaction in making the admission, that "the use of the Syllabus has spread pretty widely, and it is to be hoped that it will continue to do so" (Prof. Henrici, British Association address, NATURE, vol. xxviii. p. 500). It is to be borne in mind that the Professor hardly gave the Syllabus a fair trial, though he says that when it appeared "I resolved to give it a thorough trial, and took the best means in my power to form an opinion on its merits by introducing it into one of my classes. The fact that it did not quite satisfy me, and that I gave up its use again, does not of course prove that it fails also for use in schools, for which it was originally intended."

These students had, we assume, to take down in writing the Professor's proofs, and it is not as agreeable work to "grind up" manuscript as it is to read a printed page; then there would be by-gone remains of the old text-book haunting the students' brains, want of familiarity with the Syllabus possibly on the teacher's part, and finally shortness of time over which the trial extended. At this point we may cite some remarks by the late Dr. Todhunter, which make as much for Syllabus upholders as for Euclidians. "It will be hard to secure that pupils shall be selected of equal power, and be trained with equal assiduity; and then if our teacher is to try various methods he is liable, since he knows that a controversy is now existing as to the result, to deviate from impartiality in his treatment of the rival methods. Moreover, there may naturally arise some disagreement as to the means to be used for testing the value of the results, and as to the accurate application of the principle which may be finally adopted for this end" ("Conflict of Studies," &c., p. 156). A fair trial would be to take two classes of students of as nearly as possible equal mental calibre, and with equal want of acquaintance with geometry, and to take each through the respective courses for the same time, and to take care that each teacher should be equally skilled and acquainted with his author and equally enthusiastic, for, as our essayist just cited writes, "if the teacher is only languid without being positively hostile, his real sentiments are soon discovered: hypocrisy has but a slender chance of deceiving school-boys" (p. 164). But such a fancy is Utopian; the hope of the Association at first lies in such far-away parts as the Cape and India, where its work is being taken up by enthusiastic and able teachers.

We have read the proofs, and believe them to be thoroughly accurate; there is also a careful avoidance of all looseness of language. Dr. Todhunter's "deliberate judgment" was that "our ordinary students would suffer very considerably if instead of the well-reasoned system of Euclid any of the more popular but less rigid manuals were allowed to be taken as a substitute" (p. 168). So